one particular band and will not be any larger than the magnitude of the yardstick coefficient in each band. The yardstick coefficients will always be accurately represented. The yardstick amplitude information is not discarded as in some prior art methods, but is used very efficiently for its own direct use and for bit allocation. Relative to the method discussed in the Dolby paper, the invention uses the available bits more efficiently. In the Dolby method, the exponents of the peak spectral values for each band are encoded. Thus, a gross estimate of the amplitude of a band is first made. Subsequently, all of the coefficients, including the peak coefficient are encoded and transmitted using a finer estimate of their magnitude. Thus, the accuracy of the peak amplitudes is the same as that of other coefficients in the same band. Further, the accuracy of the yardstick coefficients in the present invention ensures that accurate ranges are used for determining reconstruction levels, which allows more efficient use of available bits.

In addition to the foregoing specific implementations of the method and apparatus of the invention, additional variations are within the intended scope of the claims. It is possible to incorporate techniques that take into account the perceptual properties of human observers, in addition to, the estimation of the masking level.

Further, more than one frame at a time may be considered. For instance, in the special case of silence, bits can be taken away from the frame in which the silence occurs, and given to another. In less extreme cases, it may still be appropriate to devote fewer bits to one frame than another. The establishment of bands can be done "on-the-fly", by including in a band sequential coefficients that are close to each other, and then beginning a new band upon a coefficient of significantly different magnitude.

The method and apparatus of the invention can also be applied to any data that is encoded, for instance to two-dimensional signals. The data need not have been transformed. The invention can be applied to time domain samples x(n), except that in the case of audio, the results will not be as good as they would be if the data were transformed. Transformation is typically applied to data to exploit patterns within the data. However, transformation need not be applied and, in some cases, where the data tends toward randomness, it is not typically beneficial. In the case of time domain samples the coefficients will, in fact be sampled signal elements having sampled amplitudes of the actual sampled signal, rather than some transformation thereof into another domain. The method of the invention is applied in the same fashion, excluding the transformation and inverse transformation steps. Similarly, the apparatus of the invention would in that case not require the forward and inverse transform operators. (It might,however, still be beneficial to perform the yardstick-only transformation.)

Further, interaction between frames can also be implemented.

The foregoing discussion should be understood as illustrative and should not be considered to be limiting in any sense. While this invention has been particularly shown and described with references to preferred embodiments thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention as defined by the claims.

Having described the invention, what is claimed is:

1. A method for encoding a selected aspect of a signal that is defined by signal elements that are discrete in at least one dimension, said method comprising the steps of:

a. dividing the signal into at least one band, at least one of said at least one band(s) having a plurality of adjacent signal elements;

b. in at least one band, identifying a signal element having a magnitude with a preselected size relative to other signal elements in said at least one band(s) and designating said signal element as a "yardstick" signal element for said at least one band(s); and

c. encoding the location of at least one yardstick signal element(s) with respect to its position along said at least one dimension in which said signal elements are discrete within its respective band.

2. The method of claim 1, further comprising the step of quantizing the magnitude of said at least one yardstick signal element(s) for which the location was encoded.

3. The method of claim 2, at least one of said yardstick signal elements having a magnitude that is greater than the magnitude of any other signal element in its respective band.

4. The method of claim 2, at least one of said yardstick signal elements having a magnitude that is greater than the magnitude of all but one other signal elements in its respective band.

5. The method of claim 2, at least one of said yardstick signal elements having a magnitude that is greater than the magnitude of all but a preselected number of other signal elements in its respective band.

6. A method for decoding a code representing a selected aspect of a signal that is defined by signal elements that are discrete in at least one dimension, which code has been encoded by a method comprising the steps of:

a. dividing the signal into at least one band, at least one of said at least one band(s) having a plurality of adjacent signal elements;

b. in at least one band, identifying a signal element having a magnitude with a preselected size relative to other signal elements in said at least one band(s) and designating said signal element as a "yardstick" signal element for said at least one band(s);

c. encoding the location of at least one yardstick signal element(s) with respect to its position along said at least one dimension in which said signal elements are discrete within its respective band;

d. quantizing the magnitude(s) of said at least one yardstick signal element(s) for which the location was encoded; and

e. using a function of said encoded location(s) and magnitude(s) of said at least one yardstick signal element(s) to encode said selected aspect of said signal;

said method of decoding comprising the step of translating said code based on a function that is appropriately inversely related to said function of the location(s) and magnitude(s) used to encode said code.

7. An apparatus for encoding a selected aspect of a signal that is defined by signal elements that are discrete in at least one dimension, said apparatus comprising:

a. means for dividing the signal into at least one band, at least one of said at least one band(s) having a plurality of adjacent signal elements;

b. in at least one band, means for identifying a signal element having a magnitude with a preselected size relative to other signal elements in said at least one band(s) and means for designating said signal element as a "yardstick" signal element for said band;

c. means for encoding the location of at least one yardstick signal element(s) with respect to its position along

said at least one dimension in which said signal elements are discrete within its respective band; and

d. means for quantizing the magnitude of said at least one yardstick signal element(s) for which the location was encoded.

8. An apparatus for decoding a code representing a selected aspect of a signal that is defined by signal elements that are discrete in at least one dimension, which code has been encoded by an apparatus comprising:

a. means for dividing the signal into at least one band, at least one of said at least one band(s) having a plurality of adjacent signal elements;

b. means for, in at least one band, identifying a signal element having a magnitude with a preselected size relative to other signal elements in said at least one band(s) and designating said signal element as a "yardstick" signal element for said at least one band(s);

c. means for encoding the location of at least one yardstick signal element(s) with respect to its position along said at least one dimension in which said signal elements are discrete within its respective band;

d. means for quantizing the magnitude of said at least one yardstick signal element(s) for which the location was encoded; and

e. means for using a function of said encoded location and magnitude of said at least one yardstick signal element (s) to encode said selected aspect of said signal;

said decoding apparatus comprising:

i. a yardstick location decoder; and

ii. a code translator that applies a translating rule that is appropriately inversely related to said function of the location and magnitude used to encode said selected aspect of said signal.

* * * * *

9. A method of encoding a signal defined by signal elements that are discrete in at least one dimension, the method comprising:

dividing at least some of the signal elements into a plurality of bands, at least one band having a plurality of adjacent signal elements;

selecting a signal element from each of more than one of the bands, at least one of the selected signal elements being from one of the bands having a plurality of adjacent signal elements; and

performing a transformation on the selected signal elements.

10. The method of claim 9 wherein selecting the signal element comprises identifying the signal element having the largest magnitude within a band.

10

~~11~~. The method of claim 9 wherein selecting the signal element comprises identifying the signal element having a preselected size relative to the other signal elements within a band.

11

~~12~~. The method of claim 9 wherein performing a transformation comprises performing a transformation on the magnitudes of the selected signal elements.

12

~~13~~. The method of claim 9 wherein the signal elements comprise samples of a signal.

13

~~14~~. The method of claim 9 wherein the signal elements comprise transform coefficients.

14 13

~~15~~. The method of claim ~~14~~ wherein the transform coefficients comprise transform coefficients derived from a frame obtained by applying a window to samples of a signal.

15 13

~~16~~. The method of claim ~~14~~ wherein the transform coefficients correspond to at least one of the following: discrete cosine transform coefficients and time-domain aliasing cancellation coefficients.

17. The method of claim 9 wherein performing the transformation on the selected signal elements comprises performing at least one of the following transformations: a discrete cosine transformation and a discrete Fourier transformation.

16

~~18~~. The method of claim 9 wherein performing the transformation comprises using a transformation that reduces the average number of bits needed to encode the selected signal elements.

17. The method of claim 9 further comprising quantizing results of the transformation.

18. The method of claim 17 further comprising using the quantized results of the transformation to encode signal elements.

19. The method of claim 18 wherein using the quantized results of the transformation comprises allocating bits to signal elements.

22. The method of claim 20 wherein using the quantized results of the transformation comprises determining reconstruction levels for signal elements.

20. The method of claim 9 further comprising using the selected signal elements to encode signal elements.

24. The method of claim 23 wherein using the selected signal elements to encode signal elements comprises using the selected signal elements to encode signal elements in the respective bands of the selected signal elements.

25. The method of claim 23 wherein using the selected signal elements to encode signal elements comprises allocating bits between the bands.

26. The method of claim 23 wherein using the selected signal elements to encode signal elements comprises allocating bits to signal elements.

27. The method of claim 23 wherein using the selected signal elements to encode signal elements comprises determining reconstruction levels for signal elements.

28. A method of encoding a signal defined by signal elements that are discrete in at least one dimension, the method comprising:

dividing at least some of the signal elements into a plurality of bands, at least one band having a plurality of adjacent signal elements;

selecting a signal element from each of more than one of the bands, at least one of the selected signal elements being from one of the bands having a plurality of adjacent signal elements;

processing the selected signal elements; and

performing a transformation on the processed selected signal elements.

29. The method of claim 28 wherein the processing comprises quantizing.

30. The method of claim 29 wherein the quantizing comprises quantizing the magnitudes of the selected signal elements.

24 23
31. The method of claim 30 wherein the quantizing the magnitudes of the selected signal elements comprises quantizing the magnitudes using exponents associated with the magnitudes.

25 21
32. The method of claim 28 wherein the processing comprises a non-linear mapping.

24 21
33. The method of claim 28 wherein selecting the signal element comprises identifying the signal element having the largest magnitude within a band.

27 21
34. The method of claim 28 wherein selecting the signal element comprises identifying the signal element having a preselected size of magnitude relative to other signal elements within a band.

28 21
35. The method of claim 28 wherein performing the transformation comprises performing at least one of the following: a discrete cosine transformation and a discrete Fourier transformation.

36. The method of claim 28 wherein the signal elements comprise samples of a signal.

29 21
37. The method of claim 28 wherein the signal elements comprise transform coefficients.

30 29
38. The method of claim 37 wherein the transform coefficients comprise transform coefficients derived from a frame obtained by applying a window to samples of a signal.

31 29
39. The method of claim 37 wherein the transform coefficients correspond to at least one of the following: discrete cosine transform coefficients and time-domain aliasing cancellation coefficients.

32 21
40. The method of claim 28 wherein performing the transformation comprises using a transformation that reduces the average number of bits needed to encode the processed selected signal elements.

33 21
41. The method of claim 28 further comprising using the processed selected signal elements to encode signal elements.

34 33
42. The method of claim 41 wherein using the processed selected signal elements to encode signal elements comprises using the processed selected signal elements to encode signal elements in the respective bands of the selected signal elements.

35 33
43. The method of claim 41 wherein using the processed selected signal elements to encode signal elements comprises allocating bits to the signal elements.

34 ~~44~~. The method of claim 33 ~~41~~ wherein using the processed selected signal elements to encode signal elements comprises determining reconstruction levels for signal elements.

37 ~~45~~. A method of encoding a signal defined by signal elements that are discrete in at least one dimension, the signal elements comprising transform coefficients obtained using samples of the signal, the method comprising:

dividing at least some of the signal elements into a plurality of bands, at least one band having a plurality of adjacent signal elements;

selecting a signal element from each of more than one of the bands, the selected signal element having a preselected size of magnitude relative to the other signal elements within one of the bands, at least one of the selected signal elements being from one of the bands having a plurality of adjacent signal elements;

processing the selected signal elements, the processing including quantizing the magnitudes of the selected signal elements; and

transforming the processed selected signal elements using a transformation that reduces the average number of bits needed to encode the processed selected signal elements.

38 ~~46~~. The method of claim 37 ~~45~~ further comprising encoding the transformed processed selected signal elements.

39
47. A method of decoding, comprising:

receiving an encoded signal, the signal being defined by signal elements that are discrete in at least one dimension, the encoded signal of the type encoded by:

dividing at least some of the signal elements into a plurality of bands, at least one band having a plurality of adjacent signal elements;

selecting a signal element from each of more than one of the bands, at least one of the selected signal elements being from one of the bands having a plurality of adjacent signal elements; and

performing a transformation on the selected signal elements; and

decoding at least some of the received encoded signal, the decoding comprising performing an inverse transformation.

40 39
48. The method of claim 47 wherein performing an inverse transformation comprises performing an inverse transformation on the transformed selected signal elements.

41 39
49. The method of claim 47 wherein performing the inverse transformation comprises performing at least one of the following: an inverse discrete Fourier transformation and an inverse discrete cosine transformation.

50. The method of claim 47 wherein decoding comprises using results of the inverse transformation to decode signal elements.

51. The method of claim 50 wherein using the results of the inverse transformation to decode signal elements comprises using the results to determine the allocation of bits between the bands in the encoded signal.

52. The method of claim 50 wherein using the results of the inverse transformation to decode signal elements comprises using the results to determine reconstruction levels for signal elements.

53. The method of claim 47 wherein the signal elements comprise samples of a signal.

54. The method of claim 47 wherein the signal elements comprise transform coefficients.

55. The method of claim 54 wherein the transform coefficients comprise transform coefficients derived from a frame obtained by applying a window to samples of a signal.

56. The method of claim 47 wherein decoding further comprises performing an inverse transformation on the decoded signal elements.

45

57. A method of decoding, comprising:

receiving an encoded signal, the signal being defined by signal elements that are discrete in at least one dimension, the encoded signal of the type encoded by:

dividing at least some of the signal elements into a plurality of bands, at least one band having a plurality of adjacent signal elements;

selecting a signal element from each of more than one of the bands, at least one of the selected signal elements being from one of the bands having a plurality of adjacent signal elements;

processing the selected signal elements; and

performing a transformation on the processed selected signal elements; and

decoding at least some of the received signal, the decoding comprising performing an inverse transformation.

46 45

58. The method of claim 57 wherein the performing an inverse transformation comprises performing an inverse transformation on the transformed processed selected signal elements.

47 45

59. The method of claim 57 wherein the processing comprises quantizing the magnitudes of the selected signal elements.

48 47
60. The method of claim 59 wherein the quantizing the magnitudes of the selected signal elements comprises quantizing the magnitudes using exponents associated with the magnitudes.

49 45
61. The method of claim 57 wherein the processing comprises a non-linear mapping.

50 45
62. The method of claim 57 wherein decoding comprises using results of the inverse transformation to decode signal elements.

51 50
63. The method of claim 62 wherein using results of the inverse transformation comprises using the results to decode the signal elements from the respective bands of the selected signal elements.

52 50
64. The method of claim 62 wherein using the results of the inverse transformation comprises determining reconstruction levels for signal elements.

65. The method of claim 57 wherein the signal elements comprise samples of a signal.

53 45
66. The method of claim 57 wherein the signal elements comprise transform coefficients.

67. The method of claim 66 wherein the transform coefficients comprise transform coefficients derived from a frame obtained by applying a window to samples of a signal.

68. The method of claim 66 wherein decoding further comprises performing an inverse transformation on the decoded signal elements.

69. A method of encoding a signal defined by signal elements that are discrete in at least one dimension, the method comprising:

determining a division of at least some of the signal elements into a plurality of bands, at least one of the bands having a plurality of adjacent signal elements; and

providing information describing the determined division.

70. The method of claim 69 wherein providing information describing the determined division comprises encoding information describing the determined division.

71. The method of claim 70 further comprising encoding at least some of the signal elements using the determined division.

72. The method of claim 70 wherein the determining comprises dividing based on at least one signal characteristic.

73. The method of claim 72 wherein the at least one signal characteristic comprises the total number of signal elements.

74. The method of claim 72 wherein the at least one signal characteristic comprises a magnitude of at least one signal element.

75. The method of claim 72 wherein the at least one signal characteristic comprises a difference between signal elements.

76. The method of claim 75 wherein the difference comprises a difference in signal element magnitudes.

77. The method of claim 70 wherein the determining comprises beginning a new band when adjacent signal elements significantly differ in magnitude.

78. The method of claim 77 wherein the determining comprises determining whether a difference in magnitude is significant.

79. The method of claim 70 wherein the determining comprises dividing the signal elements such that at least one band has a number of signal elements that is a power of two.

80. The method of claim 70 wherein the determining comprises dividing the signal elements such that at least two bands include a different number of signal elements.

81. The method of claim 70 wherein the encoding information describing the dividing comprises encoding the number of signal elements included in at least one band.

82. The method of claim 81, wherein the encoding the number of signal elements comprises encoding the number of signal elements included in more than one band.

83. The method of claim 70 wherein signal elements comprise samples of a signal.

84. The method of claim 70 wherein signal elements comprise transform coefficients.

85. The method of claim 84 wherein the transform coefficients comprise transform coefficients derived from a frame obtained by applying a window to samples of a signal.

86. The method of claim 84 wherein the transform coefficients comprise at least one of the following: discrete cosine transform coefficients and time-domain aliasing cancellation coefficients.

87. The method of claim 70 wherein the determining differs for different signals.

88. The method of claim 70 wherein the determining differs for different frames.

89. A method of encoding a signal defined by signal elements that are discrete in at least one dimension, the method comprising:

determining a division of at least some of the signal elements into a plurality of bands, at least one band having a plurality of adjacent signal elements; and

encoding signal elements using the determined division.

90. The method of claim 89 wherein signal elements comprise samples of a signal.

91. The method of claim 89 wherein signal elements comprise transform coefficients.

92. The method of claim 91 wherein the transform coefficients comprise transform coefficients derived from a frame obtained by applying a window to samples of the signal.

93. The method of claim 89 wherein the number of signal elements included in each band is different in at least two of the bands.

94. The method of claim 89 wherein the determining the division comprises determining based upon at least one signal characteristic.

95. The method of claim 89 further comprising encoding the determined division.

96. A method of decoding, comprising:

receiving an encoded signal, the signal being defined by signal elements that are discrete in at least one dimension, the encoded signal of the type encoded by:

determining a division of at least some of the signal elements into a plurality of bands, at least one of the bands having a plurality of adjacent signal elements; and

encoding information describing the determined division; and

decoding at least part of an encoded signal, the decoding comprising using the received encoded information describing the determined division.

97. The method of claim 96 wherein the information describing the division comprises information based on at least one characteristic of an encoded signal.

98. The method of claim 97 wherein the at least one signal characteristic comprises the total number of signal elements.

99. The method of claim 97 wherein the at least one signal characteristic comprises a magnitude of at least one signal element.

100. The method of claim 97 wherein the at least one signal characteristic comprises a difference between signal elements.

101. The method of claim 96 wherein the division comprises a division of the signal elements such that at least two bands include a different number of signal elements.

102. The method of claim 96 wherein the information comprises the number of signal elements included in at least one band.

103. The method of claim 102 wherein the information comprises the number of signal elements included in more than one band.

104. The method of claim 96 wherein signal elements comprise samples of a signal.

105. The method of claim 96 wherein signal elements comprise transform coefficients.

106. The method of claim 105 wherein the transform coefficients comprise transform coefficients derived from a frame obtained by applying a window to samples of a signal.

107. The method of claim 105 wherein the transform coefficients comprise at least one of the following: discrete cosine transform coefficients and time-domain aliasing cancellation coefficients.

108. The method of claim ~~96~~ 71 wherein the information differs for different signals.

109. The method of claim ~~96~~ 71 wherein the information differs for different frames.

110. A method of decoding, comprising:

receiving an encoded signal, the signal being defined by signal elements that are discrete in at least one dimension, the encoded signal of the type encoded by:

determining a division of at least some of the signal elements into a plurality of bands, at least one band having a plurality of adjacent signal elements; and

encoding signal elements using the dividing; and

decoding at least some of the received encoded signal using the division.

111. The method of claim 110 wherein signal elements comprise samples of a signal.

112. The method of claim 110 wherein signal elements comprise transform coefficients.

113. The method of claim 112 wherein the transform coefficients comprise transform coefficients derived from a frame obtained by applying a window to samples of a signal.

114. The method of claim 110 wherein the number of signal elements included in each band is different in at least two of the bands.

115. The method of claim 110 wherein the determining a division comprises determining based upon at least one signal characteristic.

81

116. A method of encoding a signal defined by signal elements that are discrete in at least one dimension, the method comprising:

dividing at least some of the signal elements into a plurality of bands, at least one band having a plurality of adjacent signal elements;

selecting a signal element from each of more than one of the bands, at least one of the selected signal elements being from one of the bands having a plurality of signal elements;

processing the selected signal elements;

performing a transformation on the processed selected signal elements;

encoding the transformed processed selected signal elements; and

encoding information describing the dividing.

82 81

117. The method of claim 116 wherein selecting the signal element comprises identifying the signal element having a preselected size of magnitude relative to the other signal elements within a band.

83 81

118. The method of claim 116 wherein processing the selected signal elements comprises quantizing.

84 83

119. The method of claim 118 wherein quantizing comprises quantizing magnitudes of the selected signal elements.

120. The method of claim 119 wherein the quantizing the magnitudes of the selected signal elements comprises quantizing the magnitudes using exponents associated with the magnitudes.

121. The method of claim 116 wherein the signal elements comprise samples of a signal.

122. The method of claim 116 wherein the signal elements comprise transform coefficients.

123. The method of claim 122 wherein the transform coefficients comprise transform coefficients derived from a frame obtained by applying a window to samples of a signal.

124. The method of claim 122 wherein the transform coefficients correspond to at least one of the following: discrete cosine transform coefficients and time-domain aliasing cancellation coefficients.

125. The method of claim 116 further comprising using the processed selected signal elements to encode signal elements.

126. The method of claim 116 wherein the encoding information describing the dividing comprises encoding the number of signal elements included in at least one band.

127. The method of claim 126, wherein the encoding the number of signal elements comprises encoding the number of signal elements included in more than one band.

~~128~~ 91. A method of decoding, comprising:

receiving an encoded signal, the signal being defined by signal elements that are discrete in at least one dimension, the encoded signal of the type encoded by:

dividing at least some of the signal elements into a plurality of bands, at least one band having a plurality of adjacent signal elements;

selecting a signal element from each of more than one of the bands, at least one of the selected signal elements being from one of the bands having a plurality of signal elements;

processing the selected signal elements;

performing a transformation on the processed selected signal elements;

encoding the transformed processed selected signal elements; and

encoding information describing the dividing; and

decoding at least some of the received encoded signal, the decoding comprising:

using the information describing the dividing; and

performing an inverse transformation.

129. The method of claim 128 wherein performing an inverse transformation comprises performing an inverse transformation on the transformed processed selected signal elements.

130. The method of claim 128 wherein selecting the signal element comprises identifying the signal element having the largest magnitude within a band.

131. The method of claim 128 wherein selecting the signal element comprises identifying the signal element having a preselected size of magnitude relative to the other signal elements within a band.

132. The method of claim 128 wherein the signal elements comprise samples of a signal.

133. The method of claim 128 wherein the signal elements comprise transform coefficients.

134. The method of claim 133 wherein the transform coefficients comprise transform coefficients derived from a frame obtained by applying a window to samples of a signal.

135. The method of claim 133 wherein the transform coefficients correspond to at least one of the following:

discrete cosine transform coefficients and time-domain aliasing cancellation coefficients.

98 91

136. The method of claim 128 further comprising using the selected signal elements to encode signal elements.

99 91

137. The method of claim 128 wherein the encoding information describing the dividing comprises encoding the number of signal elements included in at least one band.

138. The method of claim 137, wherein the encoding the number of signal elements comprises encoding the number of signal elements included in more than one band.

100

139. A method of encoding an audio-type signal, the method comprising:

sampling the audio-type signal to obtain discrete samples and constructing therefrom frames, each frame obtained by applying a window to the discrete samples;

determining a set of transform coefficients from each of at least some of the frames; and

for each of at least some of the sets of transform coefficients:

dividing at least some of the transform coefficients into a plurality of bands, at least one band having a plurality of adjacent transform coefficients;

selecting a transform coefficient from each of more than one of the bands, at least one of the selected transform coefficients being from one of the bands having a plurality of adjacent transform coefficients;

processing the selected transform coefficients; and

performing a transformation on the processed selected transform coefficients.

101 100
140. The method of claim 139 wherein processing comprises quantizing the magnitudes of the selected transform coefficients.

102 100
141. The method of claim 139 wherein selecting the transform coefficient comprises identifying the transform coefficient having a preselected size relative to other transform coefficients within a band.

103
142. A method of encoding an audio-type signal, the method comprising:

sampling the audio-type signal to obtain discrete samples and constructing therefrom frames, each frame obtained by applying a window to the discrete samples;

determining a set of transform coefficients from each of at least some of the frames;

for each of at least some of the sets of transform coefficients:

dividing at least some of the transform coefficients into a plurality of bands, at least one band having a plurality of adjacent transform coefficients; and

encoding the dividing.

104 103

143. The method of claim 142 further comprising encoding at least some of the transform coefficients using the determined division.

105 103

144. The method of claim 142 wherein the dividing differs for different frames.

106

145. A method of decoding an audio-type signal, the method comprising:

receiving an encoded audio-type signal, the encoded signal of the type encoded by:

sampling the audio-type signal to obtain discrete samples and constructing therefrom frames, each frame obtained by applying a window to the discrete samples;

determining a set of transform coefficients from each of at least some of the frames;

for each of at least some of the sets of transform coefficients:

dividing at least some of the transform coefficients into a plurality of bands, at least one band having a plurality of adjacent transform coefficients;

selecting a transform coefficient from each of more than one of the bands, at least one of the selected transform coefficients being from one of the bands having a plurality of adjacent transform coefficients;

processing the selected transform coefficients; and

performing a transformation on the processed selected transform coefficients; and

decoding the received encoded audio-type signal, the decoding comprising performing an inverse transformation.

107 106

146. The method of claim 145 wherein performing an inverse transformation comprises performing an inverse transformation on the transformed processed selected transform coefficients.

108 106

147. The method of claim 145 wherein processing comprises quantizing the magnitudes of the selected transform coefficients.

109 106

148. The method of claim 145 wherein selecting the transform coefficient comprises identifying the transform coefficient having a preselected size relative to other transform coefficients within a band

110

149. A method of decoding an audio-type signal, the method comprising:

receiving an encoded audio-type signal, the encoded signal of the type encoded by:

sampling the audio-type signal to obtain discrete samples and constructing therefrom frames, each frame obtained by applying a window to the discrete samples;

determining a set of transform coefficients from each of at least some of the frames;

for each of at least some of the sets of transform coefficients:

dividing at least some of the transform coefficients into a plurality of bands, at least one band having a plurality of adjacent transform coefficients; and

encoding the dividing; and

decoding the received encoded audio-type signal, the decoding comprising decoding the dividing.

111 110

150. The method of claim 149 further comprising decoding at least some of the transform coefficients using the decoded division.

112 110

151. The method of claim 149 wherein the dividing differs for different frames.

113

152. A method of encoding an audio-type signal, the method comprising:

sampling the audio-type signal to obtain discrete samples and constructing therefrom frames, each frame obtained by applying a window to the discrete samples;

determining a set of transform coefficients from each of at least some of the frames;

for each of at least some of the sets of transform coefficients:

dividing at least some of the transform coefficients into a plurality of bands, at least one band having a plurality of adjacent transform coefficients;

selecting a transform coefficient from each of more than one of the bands, at least one of the selected transform coefficients being from one of the bands having a plurality of adjacent transform coefficients;

processing the selected transform coefficients;

performing a transformation on the processed selected transform coefficients; and

encoding the dividing.

114

183. A method of decoding an audio-type signal, the method comprising:

receiving an encoded audio-type signal, the encoded signal of the type encoded by:

sampling the audio-type signal to obtain discrete samples and constructing therefrom frames, each frame obtained by applying a window to the discrete samples;

determining a set of transform coefficients from each of at least some of the frames;

for each of at least some of the sets of transform coefficients:

dividing at least some of the transform coefficients into a plurality of bands, at least one band having a plurality of adjacent transform coefficients;

selecting a transform coefficient from each of more than one of the bands, at least one of the selected transform coefficients being from one of the bands having a plurality of adjacent transform coefficients;

processing the selected transform coefficients;

performing a transformation on the processed selected transform coefficients; and

encoding the dividing; and

decoding the encoded audio-type signal, the decoding comprising:

performing an inverse transformation; and

decoding the dividing.